

## APPLICATION OF OPEN SOURCE PROGRAMS IN PROBABILISTIC SEISMIC HAZARD ASSESSMENT AND UTILIZATION OF SITE EFFECTS CONCERNING KERMANSHAH REGION WITH EMPHASIZING ON 12 NOV. 2017 EARTHQUAKE (MW=7.3)

Nima DOLATABADI

*M.Sc. Student, Institute of Geophysics, University of Tehran, Iran  
syn\_org939@rocketmail.com*

Ahmad SADIDKHOUY

*Assistant Professor, Institute of Geophysics, University of Tehran, Iran  
asadid@ut.ac.ir*

Ali SONGHORI

*Assistant Professor, Institute of Geophysics, University of Tehran, Iran  
alisonghori@ut.ac.ir*

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Probabilistic seismic hazard analysis has been performed for the Kermanshah within eight sites. The study area presents surpasses Alpine – Himalayan orogenic belt and located between 45.5E and 48.5E of longitude and 33N and 36N of latitude.

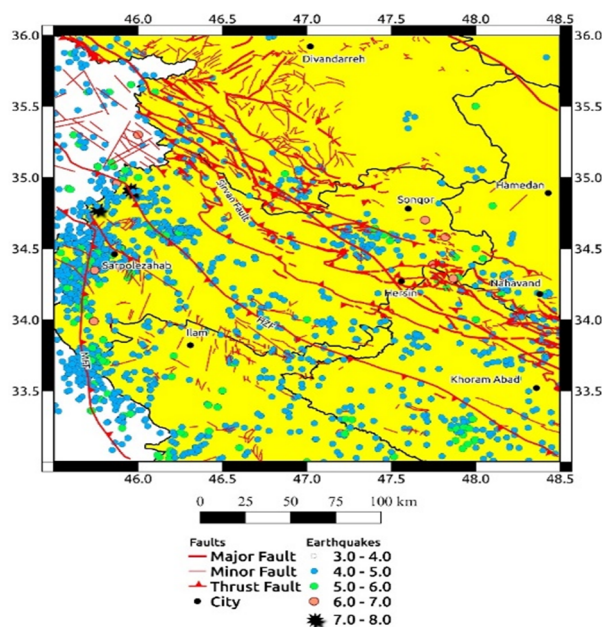


Figure 1. Seismicity map of the study area.

The seismic hazard assessment is based on homogeneous earthquake catalogue collected by merging available global catalogues (e.g. International Seismological Center (ISC), USGC, Iranian Seismological Center (IRSC), U.S. Geological Survey (USGS) and Incorporated Research Institutions for Seismology (IRIS)). The catalogue time range goes from

Historical Earthquakes to 2019. After declustering and calculating the magnitude of completeness of the catalogue, it was used in order to calibrate distribution of magnitude-frequency of events used for the seismic hazard assessment spans 119 years (from 1900 to 2019) with 2740 earthquake events and the magnitude of completeness was calculated equal to 3.1. Two seismic source zone have been selected due to seismicity, seismotectonic, regional structural geology and fault systems within neotectonic settings of the study area. The b-value stability is reserved regionally and defers less than uncertainty limit. Hazard computations have done using OpenQuake (version 3.6).

Table 1.  $V_{s30}$  considered for each site (taken from BHRC).

City	Latitude	Longitude	$V_{s30}$ (m/s)
Divandarreh	35.92	47.02	455
Hamedan	34.89	48.43	913
Hersin	34.27	47.56	530
Ilam	33.82	46.31	913
Khoram Abad	33.52	48.36	821
Nahavand	34.18	48.38	894
Sarpol-e Zahab	34.46	45.86	619
Sonqor	34.78	47.6	1477

Peak ground acceleration (PGA) and spectral acceleration (SA) at periods of 0.2, 0.8, 1.0 and 2.0 s were calculated using four ground motion prediction equations (GMPEs) for active shallow crust (Campbell & Bozorgnia, 2008) for soil properties corresponding to  $V_{s30}$  defined for 8 cities of the Kermanshah Province. The results are hazard map of area in which SA with Period of 0.2 within investigation time of 50 years is the highest for Sarpol-e Zahab city.

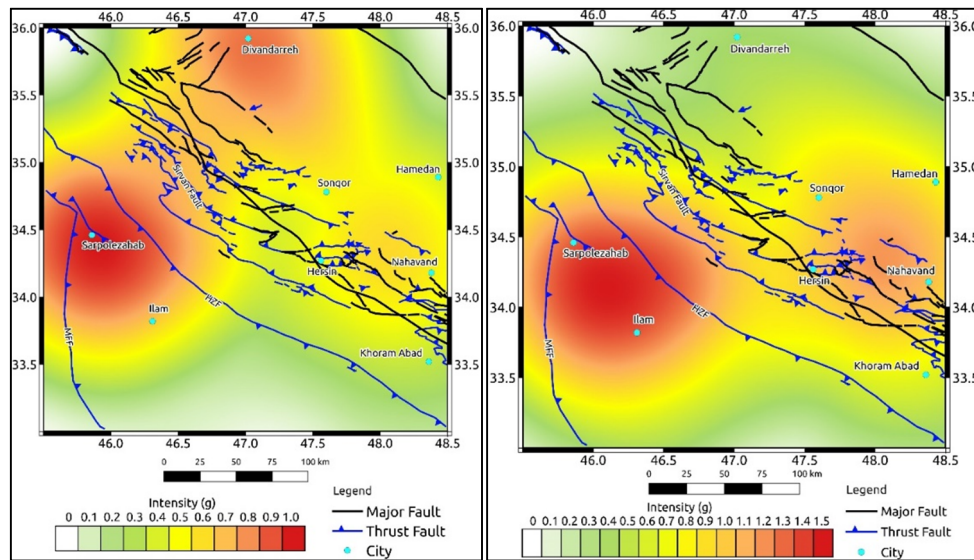


Figure 2. Hazard Map of SA for probability exceedance of 10% with structural period of 0.2 s (Right) and 0.8 s (Left).

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